

**What is claimed is:**

1. A high density capillary array electrophoresis plate comprising:  
an array of parallel microfabricated separation channels formed on a  
surface of a first microfabricated substrate and a corresponding surface of a  
second substrate bonded to the surface of said first substrate, each of said  
channels having a first end and a second end;  
an array of sample ports on a first surface of said capillary array  
electrophoresis plate; and  
an array of sample passageways connecting said array of sample  
ports and said array of separation channels, wherein each of said array of  
sample passageways is perpendicular to said first surface of said capillary  
array electrophoresis plate;  
wherein each separation channel of the plurality of separation channels is in  
fluid communication with at least one dedicated sample port through one of  
said array of sample passageways.
2. The capillary array electrophoresis plate of claim 1 further comprising:  
an array of waste ports on a second surface of said capillary array  
electrophoresis plate;  
an array of waste passageways connecting said array of waste ports  
and said array of separation channels, wherein each of said array of waste  
passageways is perpendicular to said second surface of said capillary array  
electrophoresis plate;  
a waste reservoir mount mounted on said second surface of said  
capillary array electrophoresis plate; and  
at least one electrode coupleable to said waste reservoir mount;  
wherein each separation channel of the plurality of separation channels is in  
fluid communication with said waste reservoir through one of said array of  
waste ports.

3. The capillary array electrophoresis plate of claim 2 wherein each of said array of sample passageways and each of said array of waste passageways forms a single passageway, connecting to one of said array of microfabricated separation channels.
- 5 4. The capillary array electrophoresis plate of claim 1 wherein said array of sample ports are regularly spaced on the plate and adapted to engage a parallel loading device.
- 10 5. The capillary array electrophoresis plate of claim 4, wherein the parallel loading device comprises an array of capillaries.
6. The capillary array electrophoresis plate of claim 4, wherein the parallel loading device comprises an array of metal pens.
- 15 7. The capillary array electrophoresis plate of claim 1 further comprising:  
an array of cathode ports on the first surface of said capillary array electrophoresis plate, each connected to said first end of each of the separation channels; and  
an array of anode ports on the first surface of said capillary array electrophoresis plate, each connected to said second end of each of the separation channels.
- 20 8. The capillary array electrophoresis plate of claim 7 further comprising:  
electrode arrays coupleable to each of said cathode and anode ports.
- 25 9. The capillary array electrophoresis plate of claim 1 further comprising:  
a common cathode reservoir connected to said first end of each of the separation channels;  
a common anode reservoir connected to said second end of each of the separation channels;
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an electrode for said common cathode reservoir; and  
an electrode for said common anode reservoir.

- 5 10. The capillary array electrophoresis plate of claim 9 wherein said common anode and cathode reservoirs are enclosed and each has a buffer loading port on the first surface of said capillary array electrophoresis plate.
- 10 11. The capillary array electrophoresis plate system, comprising:  
a capillary array electrophoresis plate including: an array of parallel microfabricated separation channels formed on a surface of a first microfabricated substrate and a corresponding surface of a second substrate bonded to the surface of said first substrate, each of said channels spans the full length of the plate and has a first end and a second end;  
15 an array of sample ports on a first surface of said capillary array electrophoresis plate;  
an array of sample passageways connecting said array of sample ports and said array of separation channels, wherein each of said array of sample passageways is perpendicular to said first surface of said capillary array electrophoresis plate;  
20 a cathode mount attached to the first end of said capillary array electrophoresis plate;  
an anode mount attached to the second end of said capillary array electrophoresis plate;  
an electrode in said cathode mount; and  
25 an electrode in said anode mount;  
wherein each separation channel of the plurality of separation channels is in fluid communication with at least one dedicated sample port through one of said array of sample passageways.
- 30 12. A method of forming a capillary array electrophoresis plate, comprising:

forming an array of microfabricated separation channels having a first end and a second end;

forming an array of sample ports on a first surface of said capillary array electrophoresis plate;

5 connecting the array of sample ports to the array of microfabricated separation channels through an array of sample passageways;

forming an array of cathode ports on the first surface of said capillary array electrophoresis plate, each connected to said first end of each of the separation channels;

10 forming an array of anode ports on the first surface of said capillary array electrophoresis plate, each connected to said second end of each of the separation channels;

connecting an electrode array to each of said array of cathode ports;

and

15 connecting an electrode array to each of said array of anode ports.

13. A method of forming a capillary array electrophoresis plate, comprising:

forming an array of microfabricated separation channels having a first end and a second end;

20 forming an array of sample ports on a first surface of said capillary array electrophoresis plate;

connecting the array of sample ports to the array of microfabricated separation channels through an array of sample passageways;

25 connecting a common cathode reservoir to said first end of each of said array of separation channels;

connecting a common anode reservoir to said second end of each of said array of separation channels;

connecting an electrode to said cathode reservoir; and

30 connecting an electrode to said anode reservoir.

14. The method of forming a capillary array electrophoresis plate as in claim 12 or 13, further comprising:
- forming an array of waste ports on a second surface of said capillary array electrophoresis plate;
  - 5 connecting the array of waste ports and the array of separation channels through an array of waste passageways, wherein each of said array of waste passageways is perpendicular to said second surface of said capillary array electrophoresis plate;
  - forming a waste reservoir mount;
  - 10 mounting said waste reservoir mount on said second surface of said capillary array electrophoresis plate; and
  - coupling at least one electrode to said waste reservoir mount;
- wherein each separation channel of the plurality of separation channels is in fluid communication with said waste reservoir through one of said array of waste ports.
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15. The method of claim 12 or 13, wherein a distance from each cathode port to a point where a sample port of said array of sample ports is connected to said channel is approximately equal for each separation channel.
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16. A method of forming a capillary array electrophoresis plate, comprising:
- forming a capillary array electrophoresis plate including: an array of parallel microfabricated separation channels formed on a surface of a first microfabricated substrate and a corresponding surface of a second substrate bonded to the surface of said first substrate, each of said channels spans the full length of the plate and has a first end and a second end;
  - 25 forming an array of sample ports on a first surface of said capillary array electrophoresis plate;
  - connecting said array of sample ports and said array of separation channels through an array of sample passageways, wherein each of said
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array of sample passageways is perpendicular to said first surface of said capillary array electrophoresis plate;

attaching a cathode mount to the first end of said channels;  
attaching an anode mount to the second end of said channels;  
5 coupling an electrode in said cathode mount; and  
coupling an electrode in said anode mount;

wherein each separation channel of the plurality of separation channels is in fluid communication with at least one dedicated sample port through one of said array of sample passageways.

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17. The method of claim 16, wherein a distance from each cathode port to a point where a sample port of said array of sample ports is connected to said channel is approximately equal for each separation channel.

15 18. A method for injecting multiple samples into separation channels on a capillary array electrophoresis plate, comprising:  
forming an array of microfabricated separation channels having a first end and a second end;

20 forming an array of sample ports on a first surface of said capillary array electrophoresis plate;

connecting the array of sample port to the array of microfabricated separation channels through an array of sample passageways;

connecting a common cathode reservoir to said first end of each of said array of separation channels;

25 connecting a common anode reservoir to said second end of each of said array of separation channels;

connecting an electrode to said cathode reservoir;

connecting an electrode to said anode reservoir;

loading an array of capillaries with sample solutions;

30 contacting each of said array of capillaries with a sample port of said array of sample ports; and

applying an injection voltage between the sample capillary and the anode reservoir to draw the sample into the separation channels.

19. A method for injecting multiple samples into separation channels on a capillary array electrophoresis plate, comprising:
- 5       forming an array of microfabricated separation channels having a first end and a second end;
- forming an array of sample ports on a first surface of said capillary array electrophoresis plate;
- 10       connecting the array of sample port to the array of microfabricated separation channels through an array of sample passageways;
- attaching a cathode mount to the first end of said channels;
- attaching an anode mount to the second end of said channels;
- coupling an electrode in said cathode mount;
- 15       coupling an electrode in said anode mount;
- loading an array of capillaries with sample solutions;
- contacting each of said array of capillaries with a sample port of said array of sample ports; and
- applying an injection voltage between the sample capillary and the anode reservoir to draw the sample into the separation channels.
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20. A method for injecting multiple samples into separation channels on a capillary array electrophoresis plate, comprising:
- forming an array of microfabricated separation channels having a first end and a second end;
- 25       forming an array of sample ports on a first surface of said capillary array electrophoresis plate;
- connecting the array of sample port to the array of microfabricated separation channels through an array of sample passageways;
- 30       connecting a common cathode reservoir to said first end of each of said array of separation channels;

connecting a common anode reservoir to said second end of each of  
said array of separation channels;  
connecting an electrode to said cathode reservoir;  
connecting an electrode to said anode reservoir;  
5 loading an array of metal pens with sample solutions;  
contacting each of said array of pens with a sample port of said array  
of sample ports; and  
applying an injection voltage between the pens and the anode  
reservoir to draw the sample into the separation channels.

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21. A method for injecting multiple samples into separation channels on a  
capillary array electrophoresis plate, comprising:  
forming an array of microfabricated separation channels having a first  
end and a second end;  
15 forming an array of sample ports on a first surface of said capillary  
array electrophoresis plate;  
connecting the array of sample port to the array of microfabricated  
separation channels through an array of sample passageways;  
attaching a cathode mount to the first end of said channels;  
20 attaching an anode mount to the second end of said channels;  
coupling an electrode in said cathode mount;  
coupling an electrode in said anode mount;  
loading an array of metal pens with sample solutions;  
contacting each of said array of pens with a sample port of said array  
25 of sample ports; and  
applying an injection voltage between the sample pen and the anode  
reservoir to draw the sample into the separation channels.